Docket No.: 95-512 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	
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ACHARYA	:	
	:	
Serial No.: 09/905,067	:	Group Art Unit: 2419
	:	
Filed: July 16, 2001	:	Examiner: WILSON, Robert W.

For: ARRANGEMENT FOR SWITCHING INFINIBAND PACKETS USING SWITCHING TAG AT START OF PACKET

MAIL STOP: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This is an appeal from the final rejection of claims 1-15 in the above-identified patent application.

This Appeal Brief is submitted as required by 37 C.F.R. §41.37.

1. Real Party in Interest:

This application is assigned to Advanced Micro Devices, Inc., the real party of interest.

2. Related Appeals and Interferences:

There are no other appeals or interferences known to Appellant that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims:

Claims 1-15 are pending in this application. Claims 1-15 stand rejected by the Examiner, and claims 1-15 are appealed.

4. Status of any Amendment File Subsequent to Final Rejection:

No Amendment was filed in response to the Final Rejection. A Response to the Final Rejection was filed on May 14, 2009.

5. Summary of Claimed Subject Matter:

The claimed subject matter includes independent claims 1, 7, and 10 and dependent claims 2-6, 8-9, and 11-15.

Independent 1 specifies a method comprising: detecting network nodes (e.g., 11 of Fig. 2) on a network (e.g., 10 or 32a of Fig. 2; page 4, lines 24-30) by a network manager (e.g., 30a of Fig. 2; 60-64 of Fig. 4; page 5, lines 6-10 and page 6, lines 2-10),

selecting by the network manager a tag size (e.g., "X" in steps 66, 68 of Fig. 4; page 5, line 32 to page 6, line 2; page 6, lines 11-17), as a prescribed number of bits (e.g., page 5, lines 25-28; page 6, lines 11-17), of an address field of a network to be used for switching data packets traversing the network, based on a number (e.g., N in 64, 66 of Fig. 4) of the detected network nodes (e.g., 66 of Fig. 4; page 3, lines 5-16; page 4, lines 19-20; page 5, lines 10-12 and 26-31; page 6, lines 11-14), each data packet having a header with content (e.g., 40 of Figs. 3A, 3B; page 5, lines 13-25), and

configuring (e.g., 68, 70 of Fig. 4; page 5, lines 26-31; page 6, lines 15-20) by the network manager each network switch of the network to switch each of the data packets based on a corresponding switching tag (e.g., 57 of Fig. 3B, 72 through 82 of Fig. 4; page 6, line 19 to page 7, line 2), added to a start (59 of Fig. 3B) of the corresponding data packet (Fig. 3B; page 5, lines 24-25) and the switching tag having the selected tag size of the address field, without altering the content of the header (40 of Figs. 3A, 3B).

Independent claim 7 specifies a network manager (e.g., 30a of Fig. 2; page 4, lines 24-27) comprising:

an explorer resource (e.g., 36 of Fig. 2) configured for detecting network nodes (e.g., 11 of Fig. 2) on the network (e.g., 60-64 of Fig. 4; page 5, lines 6-10 and page 6, lines 2-10); and

a controller (e.g., 38 of Fig. 2) configured for selecting a tag size (e.g., "X" in steps 66, 68 of Fig. 4; page 5, line 32 to page 6, line 2; page 6, lines 11-17), as a prescribed number of bits (e.g., page 5, lines 25-28; page 6, lines 11-17), of address fields of a network to be used for switching data packets traversing the network, based on a number (e.g., N in 64, 66 of Fig. 4) of the detected network nodes (e.g., 66 of Fig. 4; page 3, lines 5-16; page 4, lines 19-20; page 5, lines 10-12 and 26-31; page 6, lines 11-14), each data packet having a header with content (e.g., 40 of Figs. 3A, 3B; page 5, lines 13-25), the controller configuring (e.g., 68, 70 of Fig. 4; page 5, lines 26-31; page 6, lines 15-20) each network switch of the network to switch each of the data packets based on a corresponding switching tag (e.g., 57 of Fig. 3B, 72 through 82 of Fig. 4; page 6, line 19 to page 7, line 2), added to a start (59 of Fig. 3B) of the corresponding data packet (Fig. 3B; page 5, lines 24-25) and the switching tag having the selected tag size of the address field, without altering the content of the header (40 of Figs. 3A, 3B).

Independent claim 10 specifies a network (e.g., 10, 32a or 32b of Fig. 2; page 4, liens 24-30) within a server system, the network comprising:

a plurality of network switches (e.g., 34a, 34b of Fig. 1; page 4, lines 24-30) configured for switching data packets; and

a network manager (e.g., 30a of Fig. 2; page 4, lines 24-27) configured for detecting network nodes (e.g., 11 of Fig. 2; page 4, line 28) and the network switches (e.g., 60-64 of Fig. 4; page 5, lines 6-10 and page 6, lines 2-10), the network manager configured for selecting a tag size (e.g., "X" in steps 66, 68, of Fig. 4; page 5, line 32 to page 6, line 2; page 6, lines 11-17), as a prescribed number of bits (e.g., page 5, lines 25-28; page 6, lines 11-17), of address fields of a network to be used for switching the data packets, based on a number (e.g., N in 64, 66 of Fig. 4) of the detected network nodes and the detected network switches (e.g., 66 of Fig. 4; page 3, lines

5-16; page 4, lines 19-20; page 5, lines 10-12 and 26-31; page 6, lines 11-14), each data packet having a header with content (e.g., 40 of Figs. 3A, 3B; page 5, lines 13-25), the network manager configured for configuring (e.g., 68, 70 of Fig. 4; page 5, lines 26-31; page 6, lines 15-20) the network switches to switch each of the data packets based on a corresponding switching tag (e.g.,57 of Fig. 3B, 72 through 82 of Fig. 4; page 6, line 19 to page 7, line 2) added to a start (e.g., 59 of Fig. 3B) of the corresponding data packet (Fig. 3B; page 5, lines 24-25) and the switching tag having the selected tag size of the address field, each network switch switching a received data packet based on the corresponding switching tag, without altering the content of the header (40 of Figs. 3A, 3B).

6. Grounds of Rejection to be Reviewed on Appeal:

A. Whether claims 1-2, 7-8, and 10-12 are unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan.

B. Whether claims 3-6, 9, and 13-15 are unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan and U.S. Patent Pub. No. 2002/0165978 by Chui.

7. Arguments:

A. **Claims 1-2, 7-8, and 10-12 are not unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan.**

A1. **Independent Claims 1, 7, and 10 are not unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan.**

In the Final Office Action, the Examiner rejected independent claims 1, 7 and 10 under 35 USC §103 in view of Benayoun and Fan. The rejection fails to establish a prima facie case of obviousness, as required under §103, for the following reasons.

A1.(a) Review of Claimed Subject Matter

Each of the independent claims 1, 7, and 10 specify a network manager selecting a tag size, as a prescribed number of bits, of ***an address field*** of a network ***to be used for switching data packets*** traversing the network, based on a number of the detected network nodes, and configuring by the network manager each network switch of the network to ***switch each of the data packets based on a corresponding switching tag***, added to a start of the corresponding data packet and the switching tag having the selected tag size of the address field, ***without altering the content of the header***.

Hence, the ***switching*** of the data packet ***based on the corresponding switching tag*** requires that the switching tag that is added at the start of the corresponding data packet is to be used to ***switch*** (i.e., address) the data packet by the claimed "each network switch" to the appropriate destination in the network. As described in the specification, the positioning of the switching tag (57 of Fig. 3B) at the start 59 of the data packet enables frame forwarding decisions to be performed once the switching tag portion 57 of the data packet has been received (e.g., page 5, lines 29-31; page 7, lines 3-5); in other words, the switching tag provides all information necessary to switch the packet, and is used as an alternative to an existing destination local identifier field (DLID) 52 in the header 40 (see, e.g., Fig. 3A and page 3, lines 14-17; page 5, lines 13-31; page 6, lines 19-26).

Hence, the broadest reasonable interpretation cannot be inconsistent with the specification, where the claimed switching tag is a ***reduced*** size address field (i.e., "selecting ... a tag size, as a prescribed number of bits, of an address field ... to be used for ***switching*** data packets) (page 3, lines 14-15), the switching tag enabling "each network switch of the network to ***switch each of the data packets***" without the necessity of additional header information.

These and other features are neither disclosed nor suggested in the applied prior art. Moreover, the Examiner has the burden of demonstrating that "there was an apparent reason to combine the known elements *in the fashion claimed*." *KSR Int'l v. Teleflex, Inc.* No. 04-1350, 550 U.S. ___, Slip. op. at 14, 82 USPQ2d 1385, 1396 (U.S. Apr. 30, 2007). The rejection has failed to establish the analysis as required by the Supreme Court. Rather, the hypothetical

combination teaches no more than "the predictable use of prior art elements according to their established functions," *Id.,* with no disclosure or suggestion of the claimed features as a whole.

A1(b). Benayoun et al.

The Examiner concedes that Benayoun does not disclose "detecting nodes on a network by a network manager and selecting a size of address fields to be used for switching data packets traversing the network based on a number of the detected network nodes."

A1(b)(1)

Benayoun fails to disclose or suggest the claimed ***switching*** tag added to the start of the corresponding data packet and used for ***switching*** data packets traversing the network, as claimed. To the contrary, Benayoun describes use of a label 18 as a short fixed length value (col. 1, line 24) that is "used as an index into a table which specifies the next node in the flow" (col. 1, lines 26-27), where "[e]ach node in the network assigns an identification label to the packets when a new flow of data is received by the node" (col. 2, lines25-30; col. 3, lines 23-36). In other words, the disclosed label 18 that is added to the beginning of the packet 16 is used as an index to **identify each flow of data** that is composed of a plurality of data packets transmitted between a source node and a destination node (see, e.g., Abstract at line 5-6 and column 3, lines 7-22). In particular, column 3, lines 7-9 specify that "when a packet 16 is received by a switching node 12, a classification process identifies if this packet belongs to a ***known flow of data."***

Moreover, column 3, lines 10-14 specify that numerous classification methods may be used to classify the packet, including identifying parameters from the packet header including a flow-id field, a destination address, a source address, a port number, *or perhaps the protocol employed.* Use of parameters such as flow-id field, source address, port number, or "perhaps the protocol employed" demonstrates that the label 18 is not used for switching the data packets.

Moreover, column 3, lines 23-45 explicitly teach away from the label 18 being used for switching ***each of*** the data packets, because this portion describes that in response to reception of

a new packet that is not associated with any existing flow of data, the label assigning mechanism 20 in the switching node 12 adds a **default label** to the packet 16, requiring the label assigning mechanism 20 and 22 to execute the same algorithm in order to generate "the same label ... for a given data flow by both label assigning mechanism 20 and 22." Column 3, lines 36-40 further specify that "[t]his common label is then stored in an assigned label table 24 of the switching node 12 and in an assigned label table 26 of the adjacent switching note 14, together with the header bytes of the packet."

Consequently, Benayoun teaches away from the claimed switching ***each*** of the data packets based on the corresponding switching tag, because Benayoun requires first sending a **default label** that requires both the source and destination switching nodes to calculate the flow-specific label that is to be used.

For this reason alone the §103 rejection should be reversed because the label 18 of Benayoun is not a teaching of "prescribed number of bits [] of an ***address field***", where the prescribed number of bits of the address field being added to the start of the data packet as a switching tag used for switching ***each of the data packets.***

A1(b)(2)

Furthermore, the independent claims recite a switching tag, having a tag size as a prescribed number of bits of an address field, added to a start of the corresponding data packet, with the switching tag having the ***selected tag size of the address field***. Benayoun et al., at column 1, lines 22-23, discloses that the flow to which the packet is assigned is associated with "a short fixed length value known as a label". Thus, in Benayoun et al., since the label is of fixed size, there is no selecting a tag size as a prescribed number of bits of an address field as claimed.

As described *supra*, in Benayoun et al., when an arriving packet does not have an assigned label, a default label is used (see column 3, lines 28-29) and a "common label is then stored…together with the header bytes of the packet." Thus, since the default label is common for certain packets in Benayoun et al., the label cannot have a selected tag size of the address field as claimed. Furthermore, if the label in Benayoun et al. was modified to have the selected

tag size of the address field, this modification would improperly destroy the invention of Benayoun et al., since a default label is required when an arriving packet does not have a label. See Ex parte Hartmann, 186 USPQ. 366, 367 (PTOBOA. 1974) (reversing rejection when modification would destroy basis for invention in one or two references).

For this reason alone the §103 rejection should be reversed

A1(b)(3)

Banayoun also fails to disclose or suggest the claimed ***network manager*** that configures ***each network switch***. To the contrary, Banayoun describe that each switching node 12 includes a label assigning mechanism 20, 22, for running the same algorithm to generate the same label (see, e.g., col. 3, lines 23-36), requiring all the switching nodes to maintain *identical* label tables 24, 26 (col. 3, lines 36-45; col. 4, lines 29-33; page 5, lines 50-51).

For this reason alone the §103 rejection should be reversed

A1(c) Fan

Fan teaches away from the claimed feature of configuring the network switches to switch each of the data packets based on a corresponding switching tag added to ***a start*** of the corresponding data packet, as claimed. Fan is concerned with reducing the address size in the packets to improve the data-carrying capacity of the network (col. 1, lines 23-36; col. 7, lines 4-6).

Hence, Fan teaches away from this claimed feature by explicitly specifying that "the long addresses in the packet header are ***replaced*** by the corresponding short addresses, and the address type (long or short) is identified in the header" (column 6, lines 49-52); hence, "the packet with the shortened header is then forwarded to the destination node within the virtual address using the short address" (col. 6, lines 55-57). Note that an "address type field" is added prior to each source and destination address to enable a receiving node to identify whether the address is a short address or long address (col. 6, lines 17-20).

Fan also emphasizes that the short addresses are used to reduce the number of bits

transmitted within the virtual network for each packet (col. 7, lines 4-6); however, "if using a short address is not appropriate for any reason, the virtual network does not replace the long address with the short address" (col. 6, lines 61-63).

Hence, Fan contemplates violating existing Internet Protocol and Ethernet protocol address sizes by reducing the IP address fields and MAC address fields beyond their minimum size (col. 5, line 64 to col. 6, line 14). Fan also recognizes that such violation of existing address protocols may not be appropriate in some circumstances, and in those cases teaches that the long addresses should not be replaced with short addresses (col. 6, lines and 61-63).

Fan also teaches away from the claimed feature of configuring the network switches to switch each of the data packets based on a corresponding switching tag added to a start of the corresponding data packet, without altering the content of the header as claimed. Fan teaches away from this claimed feature by explicitly specifying that "the long addresses in the packet header are ***replaced*** by the corresponding short addresses, and the address type (long or short) is identified in the header" (column 6, lines 49-52); hence, "the packet with the shortened header is then forwarded to the destination node within the virtual address using the short address" (col. 6, lines 55-57).

Each of the independent claims, however, do ***not*** specify replacing existing address fields as in Fan, but rather specify ***adding the switching tag*** (having the selected size based on the number of detected network nodes) ***to start of the existing data packet***. For this reason alone the §103 rejection should be reversed.

A1(d) The Hypothetical Combination

The rejection provides an argument why one skilled in the art would have combined the teachings of the applied references *generally* (i.e., according to their predictable use); however, the rejection fails to provide any analysis of any "apparent reason" that one of ordinary skill in

the art would have provided any improvements *beyond* (i.e., more than) the predictable use of the applied references according to their established functions.[1]

The hypothetical combination urged in the rejection only addresses combining the references generally, with no disclosure or suggestion for teaching the claimed adding of the switching tag ***without altering the content of the header***, as claimed. The rejection disregards the requirements of Fan et al. replacing the long address with a short address in order to reduce the size of the packet and improve network capacity: in fact, the hypothetical combination still would rely on the short address (thereby altering the content of the header) because the use of the default label in Benayoun demonstrates that the default label cannot be used for switching a packet, as claimed. Moreover, the default label is used to identify a *flow* for subsequent data packets, where the flow can be classified according to numerous parameters that are distinct from the destination address specified in the packet.

Hence, the rejection disregards the explicitly claimed feature that the ***switching tag*** at the ***start of the packet*** is used for ***switching*** the data packet, ***without altering the content of the header***.[2] As such, the rejection improperly relies upon *ex post* reasoning by "[reading] into the prior art the teachings of the invention in issue".[3]

For these and other reasons, the §103 rejection should be reversed.

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[1] See *KSR Int'l v. Teleflex, Inc.* No. 04-1350, Slip. op. at 13-14, 82 USPQ2d 1385, 1396.

[2]It is well settled that each and every claim limitation must be considered. As specified in MPEP §2143.03, entitled "**All Claim Limitations Must Be Taught or Suggested**": "To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). 'All words in a claim must be considered in judging the patentability of that claim against the prior art.' *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." MPEP §2143.03 at 2100-131 (Rev. 5, Aug. 2006).

[3] *KSR Int'l v. Teleflex, Inc.,* 550 U.S. 398, ___, Slip. op. at 17, 82 USPQ2d 1385, 1397 (2007) (*quoting Graham v. John Deere Co.,* 383 U.S. 1, 148 USPQ 459, 474 (1966)).

A2. Dependent claims 2, 8, and 11-12 are not unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan.

Dependent claims 2, 8, and 11-12 are patentable in view of their respective dependency from independent claims 1, 7, and 10. Hence, this rejection should be reversed.

B. Claims 3-6, 9, and 13-15 are not unpatentable under 35 USC §103 in view of U.S. Patent No. 6,499,061 to Benayoun in view of U.S. Patent No. 6,643,269 to Fan and U.S. Patent Pub. No. 2002/0165978 by Chui.

Claims 3-6, 9, and 13-15 are patentable in view of their respective dependency from independent claims 1, 7, and 10. Hence, this rejection should be reversed.

Conclusion

For the reasons set forth above, it is clear that Appellant's claims 1-15 are patentable over the applied references. Accordingly the appealed claims 1-15 should be deemed patentable over the applied references. It is respectfully requested that this appeal be granted and that the Examiner's rejections be reversed.

To the extent necessary, Appellant petitions for an extension of time under 37 C.F.R. 1.136 and 37 C.F.R. 41.37(e). Please charge any shortage in fees due in connection with the filing of this paper, including any missing or insufficient fees under 37 C.F.R. 1.17(a) or 41.20(b)(2), to Deposit Account No. 50-0687, under Order No. 95-512, and please credit any excess fees to such deposit account.

Respectfully submitted,

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8. Claims Appendix

1. (PREVIOUSLY PRESENTED) A method comprising:

detecting network nodes on a network by a network manager;

selecting by the network manager a tag size, as a prescribed number of bits, of an address field of a network to be used for switching data packets traversing the network, based on a number of the detected network nodes, each data packet having a header with content,

configuring by the network manager each network switch of the network to switch each of the data packets based on a corresponding switching tag, added to a start of the corresponding data packet and the switching tag having the selected tag size of the address field, without altering the content of the header.

2. (ORIGINAL) The method of claim 1, wherein the configuring step includes sending a management datagram to each network switch, the management datagram specifying that switching is to be based on the switching tag, and the selected size of the switching tag.

3. (PREVIOUSLY PRESENTED) The method of claim 1, wherein detecting step and configuring step each include accessing the network according to InfiniBand™ network protocol.

4. (ORIGINAL) The method of claim 3, further comprising:

receiving by a first of the network switches an InfiniBand™ packet having a destination local identifier (DLID) specifying a destination node on the network;

adding by the first network switch a new switching tag to the start of the InfiniBand™ packet and having the selected size, and specifying the destination node based on the DLID; and

switching the InfiniBand™ packet having the new switching tag to a second of the network switches based on the switching tag.

5. (ORIGINAL) The method of claim 4, further comprising:

receiving the InfiniBand™ packet including the new switching tag by the second network switch; and

selectively removing, by the second network switch, the new switching tag from the InfiniBand™ packet based on whether the new switching tag specifies a destination node reachable by the second network switch; and

selectively outputting the InfiniBand™ packet, following removal of the new switching tag, to the destination node based on the destination node being reachable by the second network switch.

6. (ORIGINAL) The method of claim 5, further comprising selectively outputting, by the second network switch, the InfiniBand™ packet including the new switching tag to a third of the network switches based on a determined unreachability of the destination node by the second network switch.

7. (PREVIOUSLY PRESENTED) A network manager comprising:

an explorer resource configured for detecting network nodes on the network; and

a controller configured for selecting a tag size, as a prescribed number of bits, of address fields of a network to be used for switching data packets traversing the network, based on a number of the detected network nodes, each data packet having a header with content, the controller configuring each network switch of the network to switch each of the data packets based on a corresponding switching tag, added to a start of the corresponding data packet and the switching tag having the selected tag size of the address field, without altering the content of the header.

8. (ORIGINAL) The network manager of claim 7, wherein the network manager is configured for sending a management datagram to each network switch, the management

datagram specifying that switching is to be based on the switching tag, and the selected size of the switching tag.

9. (PREVIOUSLY PRESENTED) The network manager of claim 7, wherein the explorer resource and the controller each are configured for accessing the network according to InfiniBand™ network protocol.

10. (PREVIOUSLY PRESENTED) A network within a server system, the network comprising:

a plurality of network switches configured for switching data packets; and

a network manager configured for detecting network nodes and the network switches, the network manager configured for selecting a tag size, as a prescribed number of bits, of address fields of a network to be used for switching the data packets, based on a number of the detected network nodes and the detected network switches, each data packet having a header with content, the network manager configured for configuring the network switches to switch each of the data packets based on a corresponding switching tag added to a start of the corresponding data packet and the switching tag having the selected tag size of the address field, each network switch switching a received data packet based on the corresponding switching tag, without altering the content of the header.

11. (PREVIOUSLY PRESENTED) The network of claim 10, wherein the size corresponds to a selected number of bits.

12. (ORIGINAL) The network of claim 11, wherein each network switch is configured for generating address table entries based on the selected size.

13. (ORIGINAL) The network of claim 11, wherein the at least one network switch and the network nodes are configured for communication according to InfiniBand™ network

protocol.

14. (ORIGINAL) The network of claim 11, wherein each network switch is configured for adding a new switching tag to the start of an InfiniBand™ packet received from a network node and having a destination local identifier (DLID) specifying a destination node on the network, the new switching tag specifying the destination node based on the DLID and having the selected size.

15. (ORIGINAL) The network of claim 14, wherein each network switch is configured for selectively removing the new switching tag from the InfiniBand™ packet based on whether the new switching tag specifies a destination node reachable by the corresponding network switch.

9. Evidence Appendix

[No evidence attached]

10. Related Proceedings Appendix

[No Related Proceedings]